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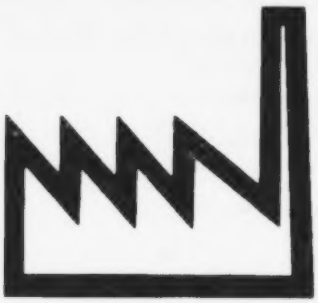

PRELIMINARY REPORT
INDUSTRY SERIES

1987 Census of Manufactures

MC87-I-26A(P)
Issued August 1989

PULP, PAPER, AND BOARD MILLS

Industries 2611, 2621, and 2631

INTRODUCTION

This report presents preliminary statistics from the 1987 Census of Manufactures for those establishments classified in the industries listed above. These data will be superseded by a more comprehensive final paperbound report. The method of data collection and use of administrative data are discussed in detail in the appendix.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The definitions of these industries are the same as those used in the 1987 Standard Industrial Classification (SIC) Manual.[1]

INDUSTRY 2611, PULP MILLS

In the 1987 Census of Manufactures, Industry 2611, Pulp Mills, had employment of 14.2 thousand. The employment figure was 15 percent below the 16.7 thousand reported in 1982. Compared with 1986, employment in 1987 decreased 7 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $4.2 billion.

In 1987, establishments in this industry accounted for 69 percent of products considered primary to the industry regardless of the industry in which they were produced (coverage ratio). In 1982, the coverage ratio was 72. The products primary to this industry appear in table 2 and aggregated to $5.4 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $2.0 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 2621, PAPER MILLS

In the 1987 Census of Manufactures, Industry 2621, Paper Mills, had employment of 129.2 thousand. The employment figure was less than 1 percent above the 129.0 thousand reported in 1982. Compared with 1986, employment in 1987 increased less than 1 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $28.9 billion.

In 1987, establishments in this industry accounted for 96 percent of products considered primary to the industry regardless of the industry in which they were produced (coverage ratio). In 1982, the coverage ratio was also 96. The products primary to this industry appear in table 2 and aggregated to $27.0 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $15.2 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 2631, PAPERBOARD MILLS

In the 1987 Census of Manufactures, Industry 2631, Paperboard Mills, had employment of 53.6 thousand. The employment figure was 4 percent below the 55.6 thousand

[1] **Standard Industrial Classification Manual: 1987.** For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Address inquiries to Bureau of the Census, Industry Division, Washington, DC 20233, or call **Sue Carter** (301) 763-2510.

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reported in 1982. Compared with 1986, employment in 1987 increased 5 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $14.0 billion.

In 1987, establishments in this industry accounted for 90 percent of products considered primary to the industry regardless of the industry in which they were produced (coverage ratio). In 1982, the coverage ratio was also 90. The products primary to this industry appear in table 2 and aggregated to $13.9 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $7.0 billion in 1987. Data on specific materials consumed appear in table 3.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in the tables in this publication:

-	Represents zero.
(D)	Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
(NA)	Not available.
(NC)	Not comparable.
(S)	Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
(X)	Not applicable.
(Z)	Less than half the unit shown.
do	Ditto.
n.e.c.	Not elsewhere classified.
n.s.k.	Not specified by kind.
pt.	Part.
r	Revised.
SIC	Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

CONTACTS FOR DATA USERS

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Census/ASM		
Durables	Kenneth Hansen	(301) 763-7304
Nondurables	Michael Zampogna	(301) 763-2510
Current Industrial Reports		
Durables	Malcolm Bernhardt	(301) 763-2518
Nondurables	Thomas Flood	(301) 763-5911
Import/Export Publications	Foreign Trade Division	(301) 763-5140
Industry Analysis and Forecasts	International Trade Administration	(202) 377-4356

Table 1. Historical Statistics for the Industry: 1987 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendix.]

Year[1]	Companies[2] (no.)	All establishments[3] Total (no.)	All establishments[3] With 20 employees or more (no.)	All employees Number (1,000)	All employees Payroll (million dollars)	Production workers Number (1,000)	Production workers Hours (millions)	Production workers Wages (million dollars)	Value added by manufacture[4] (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories[4] (million dollars)	Ratios Specialization (percent)	Ratios Coverage (percent)
INDUSTRY 2611, PULP MILLS															
1987 Census	(NA)	39	38	14.2	536.3	11.1	24.0	397.4	2 246.0	1 954.9	4 213.9	358.4	408.0	90	69
1986 ASM	(NA)	(NA)	(NA)	15.3	593.7	11.8	25.6	448.7	1 590.8	2 212.7	3 837.3	874.6	437.6	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	16.3	555.4	12.4	25.5	413.0	1 133.1	2 095.0	3 228.0	745.0	453.1	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	16.8	549.0	12.9	26.5	411.8	1 599.4	2 267.3	3 841.1	600.4	479.2	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	16.9	508.7	12.9	25.9	376.8	1 239.4	2 003.8	3 261.4	915.7	422.7	(NA)	(NA)
1982 Census	29	43	41	16.7	467.5	12.8	24.8	344.1	1 113.8	1 986.5	3 110.4	658.6	451.5	85	72
1981 ASM	(NA)	(NA)	(NA)	15.9	408.1	12.3	25.1	310.4	1 221.7	1 960.1	2 141.8	521.5	399.9	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	16.2	404.6	12.8	26.5	304.4	1 292.7	1 776.9	3 031.9	250.3	357.1	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	15.7	338.9	12.2	25.1	252.4	1 117.2	1 417.2	2 544.1	239.7	264.4	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	15.1	306.3	11.7	24.3	229.2	855.5	1 268.0	2 152.4	194.6	253.9	(NA)	(NA)
1977 Census	26	45	42	16.2	293.2	12.5	25.4	220.7	906.1	1 212.0	2 091.1	301.1	257.0	86	72
1976 ASM	(NA)	(NA)	(NA)	15.7	260.5	12.4	25.5	194.9	974.6	1 087.7	2 055.4	375.0	219.3	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	13.1	191.4	10.2	20.4	142.6	821.0	837.0	1 630.4	294.2	201.0	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	12.0	163.2	9.6	19.5	123.6	779.3	766.1	1 525.2	135.6	142.7	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	10.8	138.2	8.7	18.0	104.1	382.7	464.0	848.5	118.7	83.9	(NA)	(NA)
1972 Census	46	60	35	10.6	125.7	8.4	17.6	95.0	306.9	388.1	709.9	136.4	78.6	95	59
INDUSTRY 2621, PAPER MILLS															
1987 Census	(NA)	280	268	129.2	4 586.6	99.2	210.8	3 394.0	13 686.6	15 161.4	28 885.3	2 762.0	2 740.9	91	96
1986 ASM	(NA)	(NA)	(NA)	128.8	4 405.0	99.4	210.1	3 283.3	12 032.9	13 640.9	25 705.9	2 153.3	2 512.7	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	131.8	4 259.4	101.5	212.0	3 181.8	11 074.4	13 929.7	24 980.1	2 484.3	2 512.8	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	129.5	4 021.6	100.6	214.7	3 032.9	11 165.7	14 162.5	25 195.0	2 412.4	2 447.5	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	128.6	3 703.5	100.0	210.5	2 790.1	9 701.6	12 552.1	22 284.0	2 239.3	2 236.0	(NA)	(NA)
1982 Census	135	299	281	129.0	3 430.6	100.1	208.4	2 563.6	8 954.1	12 136.7	20 994.6	1 856.1	2 247.1	92	96
1981 ASM	(NA)	(NA)	(NA)	130.4	3 236.2	101.6	212.3	2 408.9	8 534.3	12 135.3	20 544.1	2 434.8	1 990.4	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	130.1	2 936.4	101.0	212.2	2 195.2	7 707.6	10 738.6	18 326.1	1 896.6	1 808.1	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	131.6	2 696.6	103.1	216.1	2 027.8	7 398.7	9 073.4	16 391.1	1 714.1	1 495.5	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	125.9	2 336.8	98.7	207.0	1 740.1	6 061.7	7 494.2	13 603.9	1 423.9	1 283.2	(NA)	(NA)
1977 Census	172	339	287	127.0	2 167.0	100.4	210.4	1 631.7	5 406.6	7 221.6	12 613.3	1 115.2	1 259.5	92	92
1976 ASM	(NA)	(NA)	(NA)	127.5	1 976.7	100.6	212.3	1 482.8	4 877.8	6 939.8	11 768.2	1 043.5	1 224.4	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	120.9	1 668.0	94.6	195.4	1 233.4	3 973.2	5 737.7	9 650.0	832.0	1 129.3	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	130.4	1 666.2	104.0	222.3	1 266.2	4 346.9	5 689.8	9 941.7	723.1	1 070.4	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	131.2	1 537.6	105.0	226.1	1 171.0	3 416.4	4 084.5	7 514.4	508.3	718.0	(NA)	(NA)
1972 Census	198	349	295	129.9	1 439.6	103.3	226.0	1 091.8	2 909.3	3 465.5	6 385.2	372.3	678.9	91	93
INDUSTRY 2631, PAPERBOARD MILLS															
1987 Census	(NA)	199	203	53.6	1 895.9	41.1	90.7	1 406.0	7 001.7	6 980.2	13 957.3	794.9	860.2	91	90
1986 ASM	(NA)	(NA)	(NA)	51.0	1 713.9	39.2	85.3	1 281.5	4 947.2	6 133.3	11 160.3	999.6	758.8	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	53.9	1 668.4	41.1	86.5	1 241.3	4 299.6	6 171.7	10 494.0	1 043.4	815.3	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	55.7	1 677.6	42.5	90.0	1 272.2	5 238.5	6 708.7	11 880.6	680.2	848.3	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	53.6	1 558.7	41.4	87.0	1 174.8	3 985.7	6 096.4	10 099.9	527.3	738.6	(NA)	(NA)
1982 Census	106	222	212	55.6	1 501.5	43.0	88.5	1 117.7	3 739.8	5 842.3	9 531.1	1 286.7	759.6	89	90
1981 ASM	(NA)	(NA)	(NA)	61.7	1 570.1	48.4	102.3	1 191.7	4 304.9	6 622.9	10 881.8	974.2	761.5	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	64.0	1 514.3	49.9	107.1	1 143.9	3 824.9	6 090.7	9 872.3	1 538.7	697.6	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	64.2	1 353.8	49.9	106.4	1 015.9	3 465.5	5 040.7	8 505.8	1 229.0	544.2	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	67.4	1 291.0	52.5	112.4	975.4	3 253.5	4 445.7	7 743.3	999.8	509.6	(NA)	(NA)
1977 Census	117	249	232	67.6	1 175.8	53.0	112.5	888.0	3 080.7	4 049.8	7 124.3	933.7	537.5	84	92
1976 ASM	(NA)	(NA)	(NA)	64.7	1 018.2	51.0	108.6	770.0	3 128.0	3 636.6	6 724.4	844.0	500.7	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	65.0	910.6	51.0	105.1	679.3	2 831.9	3 239.3	6 055.1	806.7	457.9	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	71.6	926.7	56.9	123.6	702.1	2 980.0	3 562.1	6 516.5	636.6	428.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	69.5	842.1	55.4	123.2	647.7	2 291.0	2 579.6	4 861.8	344.4	285.4	(NA)	(NA)
1972 Census	134	273	248	68.5	778.2	54.5	121.2	588.5	1 994.4	2 152.9	4 153.5	313.5	240.4	83	94

Note: Establishments of single unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. Data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were estimated based on administrative-record information from other agencies in conjunction with industry averages. These establishments accounted for the following percent of total value of shipments: SIC 2611, 0%; SIC 2621, 1%; and SIC 2631, 1%.

[1]In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1972, see 1972 Census of Manufactures, vol. II, table 1a of the industry chapter.

[2]For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

[3]Includes establishments with payroll at any time during year.

[4]Beginning with the 1982 Census of Manufactures, all respondents were requested to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior Censuses and annual surveys of manufactures in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, inventories and value added by manufacture are not comparable to prior-year data.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987				1982			
		Number of companies with shipments of $100,000 or more	Quantity of production for all purposes	Product shipments[1]		Number of companies with shipments of $100,000 or more	Quantity of production for all purposes	Product shipments[1]	
				Quantity[2]	Value (million dollars)			Quantity[2]	Value (million dollars)
2611- —	**PULP MILLS**								
	Total	**(NA)**	**(X)**	**(X)**	**5 359.8**	**(NA)**	**(X)**	**(X)**	**3 644.2**
26111 —	Special alpha and dissolving wood pulp:								
26111 00	Special alpha and dissolving wood pulp (sulfite and sulfate for chemical conversion, papermaking, and other uses) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	11	(X)	(X)	686.9	9	(X)	(X)	593.8
26113 —	Sulfate wood pulp:								
26113 00	Sulfate wood pulp, including soda (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	32	(X)	(X)	4 123.8	36	(X)	(X)	2 510.8
26114 —	Sulfite and other wood pulp:								
26114 00	Sulfite and other wood pulp (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	12	(X)	(X)	247.5	12	(X)	(X)	183.0
26115 —	Pulp, other than wood, and miscellaneous pulp mill byproducts, n.e.c.	(NA)	(X)	(X)	280.4	(NA)	(X)	(X)	353.0
26115 11	Cotton linter pulp ..... 1,000 s tons	4	145.9	142.7	114.2	4	124.7	124.7	95.9
26115 13	Other pulp, including pulp made from straw, rag, flax, deinked paper, bagasse, etc. ..... do	7	(S)	254.5	84.5	10	(S)	510.7	153.5
26115 17	Turpentine, sulfate ..... mil gal	34	(S)	*38.1	28.8	35	(S)	*22.6	18.0
26115 19	Other cooking liquor byproducts (skimmings, binders, fuel, etc.) ..... 1,000 s tons	18	(S)	(S)	52.9	27	2 927.5	1 102.3	85.7
26115 00	Pulp, other than wood, and miscellaneous pulp mill byproducts, n.e.c., n.s.k.	-	(X)	(X)	-	-	(X)	(X)	-
26110 —	Pulp mill products, n.s.k.	(NA)	(X)	(X)	21.1	(NA)	(X)	(X)	3.6
26110 00	Pulp mill products, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	(X)	21.1	(NA)	(X)	(X)	3.6
26110 02	Pulp mill products, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	(X)	-	-	(X)	(X)	-

1987 product code	Product	1987		1982	
		Number of companies with shipments of $100,000 or more	Value of product shipments[1] (million dollars)	Number of companies with shipments of $100,000 or more	Value of product shipments[1] (million dollars)
2621- —	**PAPER MILLS**				
	Total	**(NA)**	**27 021.2**	**(NA)**	**20 222.2**
26211 —	Newsprint:				
26211 00	Newsprint (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	18	2 747.3	23	2 161.6
26212 —	Uncoated groundwood papers:				
26212 00	Uncoated groundwood papers (uncoated papers containing more than 10 percent mechanical fiber) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	19	915.4	23	841.5
26213 —	Clay coated printing and converting papers:				
26213 00	Clay coated printing and converting papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	24	5 896.5	29	3 787.3
26214 —	Uncoated free sheet:				
26214 00	Uncoated free sheet (uncoated papers containing not more than 10 percent mechanical fiber) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	52	7 999.1	55	5 530.6
26215 —	Bleached bristols, excluding cotton fiber index and bogus:				
26215 00	Bleached bristols, excluding cotton fiber index and bogus (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	20	778.4	23	605.2
26216 —	Cotton fiber papers and thin papers:				
26216 00	Cotton fiber papers and thin papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	22	655.8	33	599.3
26217 —	Unbleached kraft packaging and industrial converting papers:				
26217 00	Unbleached kraft packaging and industrial converting papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	29	1 317.7	30	1 199.8
26218 —	Packaging and industrial converting papers, except unbleached kraft:				
26218 00	Packaging and industrial converting papers, except unbleached kraft (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	32	971.9	34	666.7
26219 —	Special industrial papers:				
26219 00	Special industrial papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	36	1 037.1	43	942.8
2621A —	Tissue papers and other machine-creped papers:				
2621A 00	Tissue papers and other machine-creped papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	26	4 330.0	33	3 685.4

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987		1982	
		Number of companies with shipments of $100,000 or more	Value of product shipments[1] (million dollars)	Number of companies with shipments of $100,000 or more	Value of product shipments[1] (million dollars)
2621- —	**PAPER MILLS**—Con.				
2621B —	Construction papers:				
2621B 00	Construction papers (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	14	117.5	17	165.3
26210 —	Paper mill products, n.s.k.	(NA)	254.4	(NA)	36.7
26210 00	Paper mill products, n.s.k., typically for establishments with 5 employees or more (see note)	(NA)	254.4	(NA)	36.7
26210 02	Paper mill products, n.s.k., typically for establishments with less than 5 employees (see note)	-	-	-	-
2631- —	**PAPERBOARD MILLS**				
	Total	**(NA)**	**13 885.6**	**(NA)**	**9 390.0**
26311 —	Unbleached kraft packaging and industrial converting paperboard:				
26311 00	Unbleached kraft packaging and industrial converting paperboard (80 percent or more virgin wood pulp kraft sulfate process) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	28	6 435.6	28	4 076.1
26312 —	Bleached packaging and industrial converting paperboard:				
26312 00	Bleached packaging and industrial converting paperboard (80 percent or more virgin bleached wood pulp) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	22	2 558.8	23	2 146.0
26313 —	Semichemical paperboard:				
26313 00	Semichemical paperboard (75 percent or more virgin wood pulp, the predominant portion of which is produced by semichemical process; including corrugating medium and other uses) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	20	1 580.9	24	1 012.5
26314 —	Recycled paperboard:				
26314 00	Recycled paperboard (paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion of its furnish being recycled fibers sometimes including a very minor portion of virgin fibers) (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	61	3 026.8	76	2 062.1
26318 —	Wet machine board:				
26318 00	Wet machine board, including binders' board and shoe board (for additional detail, see Current Industrial Report MA-26A, Pulp, Paper, and Board)	11	71.3	11	62.8
26310 —	Paperboard mill products, n.s.k.	(NA)	212.3	(NA)	30.4
26310 00	Paperboard mill products, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	212.3	(NA)	30.4
26310 02	Paperboard mill products, n.s.k., typically for establishments with less than 10 employees (see note)	-	-	-	-

Note: In 1987 Census of Manufactures, data for establishments of small single unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoffs used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1987 and 1982 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

[1]Data reported by all producers, not just those with shipments of $100,000 or more.

[2]For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

Table 3. Materials Consumed by Kind: 1987 and 1982

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material		1987 Quantity[1]	1987 Delivered cost (million dollars)	1982 Quantity[1]	1982 Delivered cost (million dollars)
	INDUSTRY 2611, PULP MILLS					
	Materials, parts, containers, and supplies[3]		**(X)**	**1 599.3**	**(X)**	**1 549.4**
	Pulpwood:					
	Softwood:					
	Bolts and logs:					
241101	Spruce and true fir	1,000 cords	179.3	10.4	561.2	41.5
241102	Hemlock	do.	769.3	43.8	**498.8	34.6
241103	Jack pine	do.	-	-	(D)	(D)
241104	Southern pine	do.	3 902.2	247.6	3 358.0	226.6
241105	Other softwoods, including Douglas fir	do.	(D)	(D)	(D)	(D)
242157	Chips	do.	4 087.1	243.5	3 882.1	264.5
242015	Slabs, cores, sawdust, bark, and other mill residues	do.	(D)	(D)	(D)	(D)
	Hardwood:					
	Bolts and logs:					
241106	Northern mixed hardwoods	1,000 cords	(D)	(D)	(D)	(D)
241107	Poplar (aspen and popple)	do.	(D)	(D)	(D)	(D)
241108	Southern mixed hardwoods	do.	2 245.5	114.0	1 457.7	88.7
241119	Other hardwoods	do.	418.5	25.8	(D)	(D)
242013	Slabs, wood chips, cores, sawdust, bark, and other mill residues	do.	1 183.9	66.7	1 055.0	78.2
081111	Stumpage cost (cost of timber, excluding land, cut and consumed at same establishment)		(X)	-	(X)	(*)
	Chemicals:					
147901	Sulfur	1,000 l tons	92.4	11.1	91.1	10.9
281211	Chlorine	1,000 s tons	396.6	60.8	346.0	42.8
281238	Sodium hydroxide (caustic soda) (100 percent NaOH)	do.	626.7	80.1	579.8	117.8
281228	Sodium carbonate (soda ash) (98 to 100 percent Na_2CO_3)	do.	(D)	(D)	(*)	(*)
281976	Sodium sulfate, including salt cake (100 percent Na_2SO_4)	do.	(D)	(D)	97.4	10.7
281977	Sodium chlorate (100 percent $NaClO_3$)	do.	136.7	42.4	115.5	43.5
281611	Titanium dioxide, composite and pure (100 percent TiO_2)	mil lb.	6.6	4.8	(*)	(*)
281961	Aluminum sulfate (17 percent Al_2O_3)	1,000 s tons	13.7	1.8	12.3	1.8
289956	Rosin sizing	mil lb.	5.1	1.5	6.4	2.1
327401	Lime	1,000 s tons	350.2	18.6	263.8	16.8
	Wood pulp:					
261102	Produced at affiliated or associated mills at other locations	1,000 s tons	-	(D)	-	-
261103	Produced and consumed at same location	do.	(X)	-	(S)	(X)
261104	Purchased market wood pulp	do.	(D)	(D)	(D)	(D)
	Wastepaper:					
190006	Mixed	1,000 s tons	(D)	(D)		
190007	News	do.	-	-		
190008	Corrugated	do.	-	-	296.8	26.2
190009	High grade pulp substitutes	do.	-	-		
190010	High grade deinking	do.	(D)	(D)		
	Other materials:					
207431	Cotton linters	mil lb.	386.1	36.6	342.2	34.8
190015	Other fibrous materials, including rags, straw, and bagasse	1,000 s tons	(D)	(D)	(D)	(D)
145501	Kaolin and ball clay	do.	(D)	(D)	(D)	(D)
204609	Starch	mil lb.	(D)	(D)	*52.3	7.6
282132	Synthetic resins-styrene-butadiene resins	do.	-	-	(D)	(D)
282133	Synthetic resins-polyvinyl acetate	do.	-	-	(D)	(D)
265001	Paperboard boxes, containers, and corrugated paperboard		(X)	(D)	(X)	(*)
970099	All other materials, parts, containers, and supplies		(X)	354.2	(X)	*456.9
971000	Materials, parts, containers, and supplies, n.s.k.[2]		(X)	111.1	(X)	2.7
	INDUSTRY 2621, PAPER MILLS					
	Materials, parts, containers, and supplies[3]		**(X)**	**12 399.3**	**(X)**	**9 306.8**
	Pulpwood:					
	Softwood:					
	Bolts and logs:					
241101	Spruce and true fir	1,000 cords	2 329.1	126.2	1 781.2	138.3
241102	Hemlock	do.	843.0	61.7	467.1	28.1
241103	Jack pine	do.	896.8	49.7	1 638.3	107.0
241104	Southern pine	do.	9 756.2	608.7	5 832.9	393.4
241105	Other softwoods, including Douglas fir	do.	1 036.7	69.1	*1 178.3	62.9
242157	Chips	do.	9 968.4	607.4	10 804.4	828.3
242015	Slabs, cores, sawdust, bark, and other mill residues	do.	972.8	18.9	1 301.3	33.2
	Hardwood:					
	Bolts and logs:					
241106	Northern mixed hardwoods	1,000 cords	1 523.1	81.8	2 134.0	104.8
241107	Poplar (aspen and popple)	do.	1 460.3	76.4	1 188.6	69.7
241108	Southern mixed hardwoods	do.	5 113.8	273.2	2 376.3	134.9
241119	Other hardwoods	do.	1 026.2	55.3	475.0	21.6
242013	Slabs, wood chips, cores, sawdust, bark, and other mill residues	do.	4 194.7	231.5	3 523.9	198.7
081111	Stumpage cost (cost of timber, excluding land, cut and consumed at same establishment)		(X)	14.0	(X)	41.9
	Chemicals:					
147901	Sulfur	1,000 l tons	87.0	11.8	*109.5	13.8
281211	Chlorine	1,000 s tons	872.9	131.3	700.6	88.4
281238	Sodium hydroxide (caustic soda) (100 percent NaOH)	do.	1 232.6	161.8	971.8	187.4
281228	Sodium carbonate (soda ash) (98 to 100 percent Na_2CO_3)	do.	**32.5	8.6	*106.8	15.9
281976	Sodium sulfate, including salt cake (100 percent Na_2SO_4)	do.	*178.5	16.7	**353.8	37.1
281977	Sodium chlorate (100 percent $NaClO_3$)	do.	223.8	69.2	126.5	49.6
281611	Titanium dioxide, composite and pure (100 percent TiO_2)	mil lb.	347.4	284.4	255.5	180.3
281961	Aluminum sulfate (17 percent Al_2O_3)	1,000 s tons	299.7	39.3	260.5	36.4
289956	Rosin sizing	mil lb.	*153.1	57.3	*152.5	63.5
327401	Lime	1,000 s tons	766.7	48.7	576.4	36.9

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material		1987		1982	
			Quantity[1]	Delivered cost (million dollars)	Quantity[1]	Delivered cost (million dollars)
	INDUSTRY 2621, PAPER MILLS—Con.					
	Wood pulp:					
261102	Produced at affiliated or associated mills at other locations	1,000 s tons	2 972.7	1 290.3	3 029.4	1 172.9
261103	Produced and consumed at same location	do	(S)	(X)	(S)	(X)
261104	Purchased market wood pulp	do	5 324.8	2 583.7	3 674.2	1 540.2
	Wastepaper:					
190006	Mixed	1,000 s tons	439.6	88.4	587.8	71.9
190007	News	do	1 576.0	120.2	1 253.4	87.9
190008	Corrugated	do	460.8	52.4	246.7	18.3
190009	High grade pulp substitutes	do	465.0	126.9	580.2	140.7
190010	High grade deinking	do	1 166.8	132.7	*1 015.3	116.6
	Other materials:					
261151	Linter pulp	1,000 s tons	43.2	27.2	49.7	22.1
207431	Cotton linters	mil lb	42.5	17.6	39.8	19.5
190015	Other fibrous materials, including rags, straw, and bagasse	1,000 s tons	(S)	42.4	116.5	59.7
145501	Kaolin and ball clay	do	2 400.8	324.5	2 051.1	253.8
204609	Starch	mil lb	1 632.1	213.1	1 369.5	203.0
282132	Synthetic resins–styrene-butadiene resins	do	241.6	125.5	86.5	33.8
282133	Synthetic resins–polyvinyl acetate	do	(S)	17.5	**83.8	22.3
265001	Paperboard boxes, containers, and corrugated paperboard		(X)	158.4	(X)	125.2
970099	All other materials, parts, containers, and supplies		(X)	3 265.9	(X)	2 402.0
971000	Materials, parts, containers, and supplies, n.s.k.[2]		(X)	709.6	(X)	143.1
	INDUSTRY 2631, PAPERBOARD MILLS					
	Materials, parts, containers, and supplies[3]		**(X)**	**5 449.6**	**(X)**	**4 159.3**
	Pulpwood:					
	Softwood:					
	Bolts and logs:					
241101	Spruce and true fir	1,000 cords	(D)	(D)	(D)	(D)
241102	Hemlock	do	(D)	(D)	-	-
241103	Jack pine	do	(D)	(D)	-	-
241104	Southern pine	do	13 302.8	826.4	11 594.8	757.5
241105	Other softwoods, including Douglas fir	do	(D)	(D)	820.6	40.8
242157	Chips	do	13 486.5	745.2	12 153.9	808.5
242015	Slabs, cores, sawdust, bark, and other mill residues	do	254.3	8.0	904.6	39.3
	Hardwood:					
	Bolts and logs:					
241106	Northern mixed hardwoods	1,000 cords	605.2	29.6	535.8	22.5
241107	Poplar (aspen and poppie)	do	(D)	(D)	(D)	(D)
241108	Southern mixed hardwoods	do	3 685.5	164.0	2 785.1	134.5
241119	Other hardwoods	do	585.6	28.6	(D)	(D)
242013	Slabs, wood chips, cores, sawdust, bark, and other mill residues	do	4 113.8	217.6	3 438.7	162.1
081111	Stumpage cost (cost of timber, excluding land, cut and consumed at same establishment)		(X)	(D)	(X)	17.2
	Chemicals:					
147901	Sulfur	1,000 l tons	*92.2	11.6	*45.5	6.3
281211	Chlorine	1,000 s tons	336.5	49.9	288.3	33.8
281238	Sodium hydroxide (caustic soda) (100 percent NaOH)	do	966.6	106.3	601.8	127.9
281228	Sodium carbonate (soda ash) (98 to 100 percent Na_2CO_3)	do	*57.6	8.2	85.9	12.4
281976	Sodium sulfate, including salt cake (100 percent Na_2SO_4)	do	331.3	28.9	454.2	55.1
281977	Sodium chlorate (100 percent $NaClO_3$)	do	81.9	26.4	67.5	29.4
281611	Titanium dioxide, composite and pure (100 percent TiO_2)	mil lb	60.1	43.1	55.2	35.3
281961	Aluminum sulfate (17 percent Al_2O_3)	1,000 s tons	222.6	23.9	*208.2	26.2
289956	Rosin sizing	mil lb	**105.1	33.9	108.2	52.5
327401	Lime	1,000 s tons	389.4	22.0	331.8	22.3
	Wood pulp:					
261102	Produced at affiliated or associated mills at other locations	1,000 s tons	(D)	(D)	(D)	(D)
261103	Produced and consumed at same location	do	(S)	(X)	(S)	(X)
261104	Purchased market wood pulp	do	115.6	50.2	63.1	21.8
	Wastepaper:					
190006	Mixed	1,000 s tons	*1 587.1	136.8	**1 590.1	67.3
190007	News	do	1 173.8	73.4	*1 186.2	57.1
190008	Corrugated	do	6 716.8	638.4	5 360.5	289.1
190009	High grade pulp substitutes	do	719.2	117.5	*528.5	71.3
190010	High grade deinking	do	191.3	29.2	*126.0	19.7
	Other materials:					
190015	Other fibrous materials, including rags, straw, and bagasse	1,000 s tons	(S)	.9	22.1	1.2
145501	Kaolin and ball clay	do	271.9	34.1	*220.8	23.6
204609	Starch	mil lb	407.7	57.7	298.8	43.8
282132	Synthetic resins–styrene-butadiene resins	do	31.0	19.5	11.4	6.8
282133	Synthetic resins–polyvinyl acetate	do	150.9	43.8	(S)	23.8
265001	Paperboard boxes, containers, and corrugated paperboard		(X)	(D)	(X)	46.0
970099	All other materials, parts, containers, and supplies		(X)	1 484.7	(X)	1 008.4
971000	Materials, parts, containers, and supplies, n.s.k.		(X)	248.2	(X)	77.6

[1]For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[2]Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

[3]Comparable quantity totals for consumption of pulpwood, wood pulp, wastepaper, and other fibrous materials by all mills (pulp, paper, and board) are published in Current Industrial Report MA-26A, Pulp, Paper, and Board.

[4]For 1982, material codes 081111, 281228, 281611, and 265001 were included with material code 970099.

APPENDIX
Scope and Coverage and Explanation of Terms

GENERAL

The 1987 Census of Manufactures is the 32nd census of manufacturing establishments conducted in the United States. For 1987, it was conducted as part of the economic censuses, which included the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses, under authority of title 13 of the United States Code. Title 13 specifies that an economic census be conducted every 5 years to cover years ending in 2 and 7.

SCOPE AND COVERAGE

Establishment Basis of Reporting

The census of manufactures is conducted on an establishment basis. All manufacturing establishments with one paid employee or more at any time during the year are covered by the census of manufactures. Therefore, a company operating at more than one location is required to file a separate report for each location. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units which service manufacturing establishments of the same company. Where these auxiliary operations are conducted at the same location as the manufacturing operation, they are usually included in the report for the operating manufacturing establishment.

Use of Administrative Records

From a universe of approximately 350,000 manufacturing establishments in the 1987 Census of Manufactures, approximately 150,000 small single-establishment companies were excused from filing reports. Selection of the small establishment nonmail cases was done on an industry-by-industry basis. A variable cutoff was used to determine those establishments for which administrative records were to be used in place of a census report. The cutoffs were selected so the administrative-record cases would account for approximately 3 percent or less of the value of shipments for the industry. These cutoffs were then adjusted so that all single-establishment companies with less than 5 employees were excluded from the mail canvass, while all establishments with more than 20 employees were included. Where establishments in the 5 to 20 employee size range were included in the mail canvass, an abbreviated census form was frequently used.

For these nonmail establishments, (and a small number of larger establishment whose reports were not received at the time the data were tabulated) data on employment, payroll, and receipts were obtained from administrative records of other government agencies rather than from census forms. The administrative-record information was then used in conjunction with industry averages to estimate the data for these establishments. The value of shipments and cost of materials were not distributed among specific products and materials but were included in the product and material "not specified by kind" (n.s.k.) categories.

EXPLANATION OF TERMS

Number of establishments and companies–A separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

All employees–Includes all full-time and part-time employees on the payrolls at any time during the year. Included are all persons on paid sick leave, paid holidays, and paid vacations. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average of those for midmonth payroll periods of March, May, August, and November.

Production workers–Includes workers up through the working-supervisor level engaged in fabricating, processing, assembling, inspecting, receiving, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, guard services, product development, auxiliary production for plant's own use (e.g., powerplant), recordkeeping, and other closely associated services. Truckdrivers delivering ready-mixed concrete are also included in production workers.

Other employees–Includes nonproduction personnel, including those engaged in the following activities: supervision above working-supervisor level, sales (including driver/salespersons), sales delivery (truckdrivers and helpers), advertising, credit collection, installation and

servicing of own product, clerical and routine office functions, executive, purchasing, finance, legal, personnel (including cafeteria, etc.), professional, and technical employees.

Payroll–Includes the gross earnings for the "employees" defined above, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Respondents were told that in reporting they could follow the definition of payrolls used for calculating the Federal withholding tax.

Production-worker hours–Covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave when the employee was not at the plant.

Cost of materials–Refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuels consumed, regardless of whether they were purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (a) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year; (b) electric energy purchased; (c) fuels consumed for heat, power, or generating electricity; (d) work done by others on materials or parts furnished by manufacturing establishments (contract work); and (e) products bought and resold in the same condition.

Specific materials consumed (table 3)–In addition to the total cost of materials which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. These inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Establishments consuming less than a specified amount (usually $10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which administrative records were used was estimated as "not specified by kind" (n.s.k.).

Value of shipments and other receipts–Generally refers to received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts such as receipts for contract work performed for others, installation and repair receipts, sale of scrap, and sale of products bought and resold without further processing. Included are all items made by or for the establishment from materials owned by it whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In a few industries, the value of production or value of work completed is used instead of value of shipments. These industries are identified in the introduction and are footnoted in table 1.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, that is, including not only the direct costs of production but also a reasonable proportion of "all other costs" (including company overhead and profit).

Shipments or production of individual products (table 2)–In the 1987 census, detailed shipment information was collected for approximately 11,000 individual products. These products are identified by a seven-digit code and are grouped into approximately 1,500 classes of products, which in turn are primary to 459 four-digit industries. Data at the five-digit product-class level have been collected each year as part of the annual survey of manufactures. Information at the seven-digit level, collected for many industries in the current industrial reports program, is not included in this table.

Value added by manufacture–This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments for products manufactured plus receipts for services rendered. The result of this calculation is then adjusted by the addition of value added by merchandising operations (that is, the difference between the sales value and cost of merchandise sold without further manufacturing, processing, or assembly) plus the net change in finished goods and work-in-process inventories between the beginning and end of the year.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1), value added is adjusted only for the change in work-in-process inventories between the beginning and end of the year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

Value added avoids the duplication in the figure for value of shipments which results from the use of products of some establishments as materials by others. Value

added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Expenditures for new plant and equipment–Establishments in operation and any known plants under construction were asked to report their expenditures for (a) permanent additions and major alterations to manufacturing establishments and (b) new machinery and equipment used for replacement and additions to plant capacity if they are of the type for which depreciation accounts are ordinarily maintained.

These totals exclude expenditures for used plant and equipment, expenditures for land, and cost of maintenance and repairs charged as current operating expenses. Data for used plant and equipment will be published in the final industry bulletin.

End-of-year inventories–Comprised of (a) finished products; (b) work-in-process; and (c) materials, supplies, fuels, etc. Beginning in 1982, respondents were asked to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Therefore, 1982 through 1987 data for inventories are not strictly comparable to prior-year data.

Specialization and coverage ratios–An establishment is classified in a particular industry if its shipments of primary products of the industry exceed in value its shipments of the products of any other single industry. An establishments' shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). The following ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in table 1 and data on product shipments shown in table 2.

Specialization ratio–Represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio–Represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments, wherever classified.